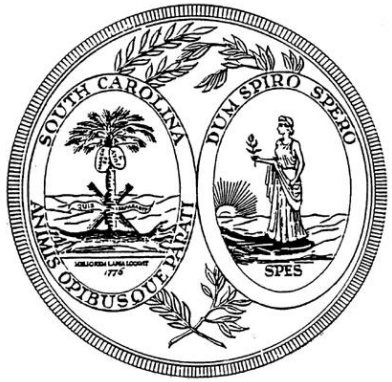
South Carolina Academic Standards and Performance Indicators for Science 2014



Instructional Unit Resource

3rd Grade

South Carolina Academic Standards and Performance Indicators for Science 2014
Third Grade Science Instructional Unit Resource

As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Third Grade have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Grade 3 Overview of Units

Unit 1	Unit 2		Unit 3		Unit 4	
PHYSICAL SCIENCE: PROPERTIES AND CHANGES IN MATTER	PHYSICAL SCIENCE: ENERGY TRANSFER--ELECTRICITY AND MAGNETISM		EARTH SCIENCE: EARTH'S MATERIALS AND PROCESSES		LIFE SCIENCE: ENVIRONMENTS AND HABITATS	
Standard	**Standard**		**Standard**		**Standard**	
3.P.2	3.P.3		3.E.4		3.L.5	
Conceptual Understanding	**Conceptual Understanding**		**Conceptual Understanding**		**Conceptual Understanding**	
3.P.2A	3.P.3A	3.P.3B	3.E.4A	3.E.4B	3.L.5A	3.L.5B
Performance Indicators	**Performance Indicators**		**Performance Indicators**		**Performance Indicators**	
3.P.2A.1 3.P.2A.2 3.P.2A.3 3.P.2A.4 3.P.2A.5	3.P.3A.1 3.P.3A.2 3.P.3A.3	3.P.3B.1 3.P.3B.2	3.E.4A.1 3.E.4A.2 3.E.4A.3	3.E.4B.1 3.E.4B.2 3.E.4B.3 3.E.4B.4	3.L.5A.1 3.L.5A.2	3.L.5B.1 3.L.5B.2 3.L.5B.3
***Science and Engineering Practices**	***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**	
S.1.A.3 S.1.A.4 S.1.A.6 S.1.A.8 S.1.B.1	S.1.A.2 S.1.A.3 S.1.A.4 S.1.A.8		S.1.A.4 S.1.A.2 S.1.A.8	S.1.A.2 S.1.A.3 S.1.A.8 S.1.B.1	S.1.A.4 S.1.A.2	S.1.A.8 S.1.A.2 S.1.A.7
***Crosscutting Concepts**	***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**	
1, 2, 3, 5, 6, 7	2, 4, 5, 6		1, 2, 3, 4, 6, 7		1, 2, 3, 4, 5, 6	

** Teachers have the discretion to enhance the selected SEP's and CCCs.*

Unit Title
Energy Transfer - Electricity and Magnetism
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
Standard 3.P.3 The student will demonstrate an understanding of how electricity transfers energy and how magnetism can result from electricity.

Conceptual Understanding
3.P.3A. Energy can be transferred from place to place by electric currents. Electric currents flowing through a simple circuit can be used to produce motion, sound, heat, or light. Some materials allow electricity to flow through a circuit and some do not.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Energy	Electricity	Motion	Electric Current	Simple Circuit
Light Energy	Heat Energy	Sound Energy	Transformation	Electrical Insulator
Electrical Conductor	Wire	Switch	Battery	Light Bulb

Performance Indicators **Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's**
3.P.3A.1 *Obtain and communicate information to develop models* showing how electrical energy can be transformed into other forms of energy (including motion, sound, heat, or light).

3.P.3A.2 *Develop and use models* to describe the path of an electric current in a complete simple circuit as it accomplishes a task (such as lighting a bulb or making a sound).
3.P.3A.3 *Analyze and interpret data from observations and investigations* to classify different materials as either an insulator or conductor of electricity.

***Science and Engineering Practices**

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

3.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
3.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
3.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

***Cross Cutting Concepts (http://www.nap.edu/read/13165/chapter/8)**

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

5. Energy and matter: The National Research Council states that this includes "Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations."(p. 84) *As electrical energy flows within a system, it can be transformed into other forms such as motion, sound, heat, or light.*

4. Systems and system models: The National Research Council states that this includes "defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *The path of an electric current in a complete simple circuit creates a system which can light a bulb or make a sound.*

6. Structure and function: The National Research Council (2012) states, "the way in which an object or living thing is shaped and its substructure determine many of its properties and functions" (p. 84). *Insulators and conductors are made of materials (structure) that determine their function.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● N/A
Subsequent Knowledge
● 6.P.3 Energy Transfer ● 6.P.3, 7.P.2 Conductors and Insulators

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

- 3.P.3A.1 Forms of Energy This lesson explores forms of energy including electrical, motion, sound, heat, and light. It provides a picture sort and a PowerPoint presentation, as well as formative and summative assessment ideas. The lesson can be found at: http://www.cpalms.org/Public/PreviewResourceLesson/Preview/46550

- 3.P.3A.2-3.P.3A.3 Electric Circuits This lesson is a three day activity that addresses the introduction to electric circuits, building an circuit to light a light bulb, and exploring conductivity. The lesson can be found at: http://www.pbslearningmedia.org/resource/phy03.sci.phys.mfe.lp_electric/electric-circuits/

- 3.P.3A.2 Circuits and Electricity This site includes several activities that introduce and/or review concepts learned about electric circuits, insulators, and conductors. The lesson can be found at: http://schools.bcsd.com/fremont/4th_Sci_Electricity_Circuits.htm

Resources
• Energy Facts This site provides facts about the different types of energy, as well as other energy information. http://www.solarschools.net/resources/stuff/different_forms_of_energy.aspx • Circuits and Conductors This interactive simulation for the computer allows students to experiment with different materials to complete a circuit and light a bulb. http://www.sciencekids.co.nz/gamesactivities/circuitsconductors.html • Solar Oven As an extension, cumulative activity, or to further demonstrate solar energy, the students can make a solar oven. The instructions can be found at: http://www.hometrainingtools.com/a/build-a-solar-oven-project/ • Learn About Electricity This is an informative website that discusses forms of electricity, how electrical energy is transformed, and the basics of circuits. There are several graphics for students that would be helpful as they learn about electricity. The information can be found at: http://sciencewithme.com/learn-about-electricity/
Sample Formative Assessment Tasks/Questions **Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)**
• Provide each student with the materials necessary to light a light bulb in a baggie with no instructions (see Electric Circuit lesson above for materials list). Have the students light the bulb and then illustrate their circuit with all of the parts labeled correctly. They can also write the steps to lighting the bulb.

Unit Title
Energy Transfer - Electricity and Magnetism
Standard **http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf**
3.P.3 The student will demonstrate an understanding of how electricity transfers energy and how magnetism can result from electricity.

Conceptual Understanding

3.P.3B. Magnets can exert forces on other magnets or magnetizable materials causing energy transfer between them, even when the objects are not touching. An electromagnet is produced when an electric current passes through a coil of wire wrapped around an iron core. Magnets and electromagnets have unique properties

New Academic Vocabulary

Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.

Magnet	North Pole	Attraction	Repulsion	Electromagnet
Magnetic Field	Iron Core	Conductive Wire	South Pole	

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's.

3.P.3B.1 *Develop and use models to describe* and compare the properties of magnets and electromagnets (including polarity, attraction, repulsion, and strength).

3.P.3B.2 *Plan and conduct scientific investigations* to determine the factors that affect the strength of an electromagnet.

***Science and Engineering Practices**

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

3.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

3.S.1A.3 Plan and conduct scientific investigations to answer questions, test predictions and develop explanations: (1) formulate scientific questions and predict possible outcomes, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.
***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)** **The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.**
2. Cause and effect: The National Research Council states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *The result of an electrical current passed through a solenoid, creates an electromagnet, which by increasing each component results in a stronger electromagnet.* 4. Systems and system models: The National Research Council states that this includes "defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *Electromagnets are models of systems that can be tested and revised.* 6. Structure and function: The National Research Council (2012) states, "the way in which an object or living thing is shaped and its substructure determine many of its properties and functions" (p. 84). *The structures of magnets and electromagnets each perform a specific function.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
• 2.P.3 Properties of Magnets
Subsequent Knowledge
• 5.P.5 Magnetism • 6.P.3 Magnetism • 7.P.2 Properties of Magnets

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

- 3.P.3B.1-3.P.3B.2 Electromagnet Investigation Teams of students engage in the investigation of electromagnet properties. This resource can be found at: https://www.teachengineering.org/activities/view/cub_mag_lesson2_activity1

- 3.P.3B.1-3.P.3B.2 Interactive electromagnetic activities can be found at: http://schools.bcsd.com/fremont/4th_sci_electricity_electromagnet.htm

- 3.P.3B.1-3.P.3B.2 Magnet lessons can be found at: http://schools.bcsd.com/fremont/4th_Sci_Electricity_magnets.htm

Resources

- Many magnet computer based interactives: http://interactivesites.weebly.com/magnets-and-compass.html

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- How many paper clips? Each student will get a baggie with materials to make an electromagnet but no instructions. They must create an electromagnet and pick up as many paperclips as possible. They should illustrate, with labels, their design for their electromagnet. The students should also record their results (number of paperclips picked up) for multiple tests and document any changes/improvements made to their design.

- Picture sort of items that contain/use electromagnets and those that do not. Teacher can pull pictures from lists provided in the lessons above. Teacher could also have the students do an "Electromagnet Scavenger Hunt" around the classroom, school, or their house.

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